

# **Determining the Effectiveness of a Behavioral Economics Cafeteria Intervention at Big Walnut High School Designed to Improve Healthfulness of Student Purchases**

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## ***Abstract***

Millions of U.S. children eat breakfast and lunch daily in the school cafeteria. The food choices children make in the cafeteria influence their diet, health, and well being. Behavioral economics uses cognitive and emotional factors to influence decision-making. Applying behavioral economics strategies in the cafeteria to improve the healthfulness of student food choices includes strategies such as: product placement (e.g., displaying milk with other beverages), signage/promotions to direct students to targeted items, and training servers to suggest healthy items. The Smarter Lunchrooms Movement, developed by researchers at Cornell University, aims to encourage healthy eating habits in children by using behavioral economics techniques to aid them in making better choices in the cafeteria. The primary aim of this study is to: 1) conduct a baseline assessment of the cafeteria environment at a local high school (Big Walnut, Columbus OH); and 2) design and test an intervention to enhance the purchase and sales of healthy foods and reimbursable lunches using the Smarter Lunchrooms Movement evaluation process. To achieve this goal, we will conduct a cafeteria assessment at 3 time points: pre-intervention (2 weeks), baseline, and post intervention (2 weeks). Each lunch period will be assessed using production records, sales, direct observation, and student surveys. During the pre-intervention assessment, targeted areas for impact will be identified with the food service director (FSD) and one intervention goal and strategy will be selected. Expected findings based on previous Smarter Lunchrooms Movement research include an increase in sales of fruits, vegetables, and reimbursable meals. This study is funded by the Ohio Department of Education Team Nutrition grant.

## ***Background***

Childhood obesity has more than doubled in children and tripled in adolescents in the past 30 years (Ogden, et al., 2012). Obesity increases a child's risk of physical and mental health conditions, and has been associated with poorer academic performance. Obesity is the result of "calorie imbalance", or too few calories expended for the amount of calories consumed, but research has shown that childhood obesity is not caused by one specific factor. Childhood obesity forms from a combination of complex behavioral, genetic, and social factors including diet, caloric intake, fat intake, low physical activity and environmental triggers (Dehghan et al, 2005). Targeting young children can slow the obesity epidemic because prevention is more effective than treatment of obesity. Thus, interventions need to target mediating factors that lead to children following a healthy diet and being physical activity. School lunchrooms influence

children's eating habits and have been a focused target for recent research on the role of schools in children obesity prevention. School cafeterias are a very influential place for children as they grow up and learn not only educational material but also learn daily eating habits (Deghan et al, 2005).

The United States Department of Agriculture (USDA) imposes federal regulations for reimbursable school meals. Yet, schools may choose to offer foods served "a la carte" in the cafeteria and other locations, such as vending machines and snack bars (Neumark-Sztainer, et al., 2005). One study shows that having "a la carte" items and a school snack bar lowers fruit and vegetable purchases and increases purchases of foods higher in fat and calories (Neumark-Sztainer, et al, 2005). The "a la carte" and vending machine options tend to have lower nutritional value than reimbursable meals. These competitive foods compound the problem children face in the lunchroom. Instead of purchasing the reimbursable lunch meal, which is a balanced meal within a regulated calorie and fat range, children may gravitate towards building their own lunch with "a la carte" options. With limited nutritional regulations on "a la carte" options, children who choose "a la carte" eat empty calories, consuming foods like sugary juice drinks and bagels. Studies have shown that school lunchroom environment has a significant impact on food choices, so changes to the school lunchroom environment could be key in improving the food choices children make (Neumark-Sztainer, et al, 2005).

The Smarter Lunchrooms Movement (SLM; Cornell University) is an assessment and intervention design tool that can be applied to school cafeterias. The SLM uses behavioral economics to influence student purchases. Behavioral economics studies the effects of social and emotional factors that go into decision-making. It can easily be applied to making choices with foods in school lunchroom, as the lunchroom is a social setting and often food decisions are based on emotions. Decisions in lunchrooms often depend on whether the person is making a "hot state" or "cold state" decision. The SLM defines "hot state" as making an impulsive decision based on stressful and distracting environments (Mancino and Guthrie, 2009). School lunchrooms can be the culprit of "hot state" decisions as they can be crowded, loud and chaotic. SLM focuses on helping to make the school lunchroom calmer where students make "cold state" and more rational decisions. The SLM focuses on six research-based principles for encouraging healthy eating habits, "cold state" decisions: manage portion sizes, increase convenience, improve visibility, enhance taste expectations, utilize suggestive selling and set smart pricing strategies. With the prevalence of childhood obesity on the rise, encouraging and providing healthy eating options in school cafeterias can help students learn healthy eating habits and maintain a healthier lifestyle.

The tools found in the SLM are cost effective and easily applicable in school cafeterias. For example, a longitudinal study by Wansink et al, 2012 resulted in a 99% increase in vegetable purchases by adding creative names to vegetable items on one school's menus. The control school (no creative names were added) had a 16% decrease in vegetable purchases (Wansink, et al., 2012). The strategies are based on the mediating factors of self-efficacy (putting students in

control of their choices) and availability (making healthy choices more accessible). Giving children more than one vegetable choice has been shown to increase vegetable purchases because children feel more in control of their choices (Just & Wansink, 2009). Other SLM strategies include increasing fruit offerings in the lunchroom and moving fruit close to the cash registers to increase purchases and fruit consumption. This is known as “lunch line redesign,” where healthier options are moved to targeted locations and more frequent locations around the cafeteria. Wansink and colleagues, 2010, demonstrated that moving the salad bar away from the wall and towards the center of the lunchroom tripled the number of purchased salads (Wansink, et al., 2010). The SLM addresses availability by increasing the opportunities to take more healthy options (eg, fruits, vegetables).

Changes made in the lunchroom can help positively impact nutrition behavior. When children learn healthier eating habits earlier, they are more likely to continue them as they get older. Overall, applying the SLM tools is a low budget way to improve the nutritional value of children’s school lunch meal while helping them learn healthy eating habits.

**Objective:** The overall objective of this study was to utilize the Smarter Lunchroom Movement (SLM) evaluation to conduct baseline assessment for Big Walnut High School design and test an intervention to enhance the purchase and sales of healthy foods and reimbursable lunches using the SLM evaluation process.

**Study Aims:** The first aim of this project was to conduct a baseline assessment of the cafeteria environment at a local high school (Big Walnut, Columbus OH). The second aim was to design and test an intervention to enhance the purchase and sales of healthy foods and reimbursable lunches using the Smarter Lunchrooms Movement evaluation process

### ***Methods***

**Study design:** This study is a pre-post, one-group intervention design to determine the effectiveness of the Smarter Lunchroom methods used to improve the purchase and sales of healthy foods in the cafeteria.

**Participants/recruitment:** Researchers Kennel and McDowell targeted recruitment of a school district with a foodservice director interested in making changes to the current foodservice practices. Researchers identified Big Walnut Schools in Sunbury, OH as a viable option and initiated communication with foodservice director, Cassy Sabitini, who arranged a site visit for researchers to learn more about each school cafeteria in her district. Kennel and McDowell visited one elementary building, one middle school building and one high school building. Kennel and McDowell studied cafeteria design and used feedback from lunchroom staff in each building to select the school in most need of behavioral economic intervention. While the elementary and middle schools had standard lunch lines, the high school had various food stations, was less organized, and was Ms. Sabitini’s preference because she wanted to increase the sales of reimbursable meals at the high school.

Big Walnut High School is a rural school with 941 students enrolled (95% white, 18% free/reduced). The Big Walnut School district has received “Excellent” designations from the Ohio Department of Education every year since 2006. The academics at the school are strong as the majority of the students test proficient or higher on the Ohio Graduation Tests.

**Procedures:** In December 2012, Kennel and McDowell participated in a Smarter Lunchrooms Movement (SLM) training by Cornell University Food and Brand Lab at The Ohio State University campus. The workshop covered the theory of behavioral economics and strategies for implementing behavioral economics in the school lunchroom, and how to use the SLM research process to assess, design, and evaluate interventions. The workshop gave researchers access to all worksheets, evaluation tools, and best practice strategies to successfully conduct assessment, intervention and data analysis for evaluation.

Using the knowledge from the SLM training workshop, McDowell conducted a baseline assessment of the cafeteria environment at Big Walnut High School to identify strengths and weaknesses. In the second part of the study, McDowell designed and conducted an intervention to address problem areas identified in the baseline assessment. Researchers used the D.P.I.E. (Diagnose, Prescribe, Implement and Evaluate) General Observation Checklist to evaluate the overall environment of the lunchroom, which included evaluating everything from lighting in lunchroom to the food’s temperature. Researcher also used the Evaluation Matrix to evaluate specific categories in the lunchroom related to the components of the USDA NSLP reimbursable meal: fruit, vegetables, white milk, targeted entrée and reimbursable meal. The Evaluation Matrix identified food categories that needed the most improvement. McDowell consulted with the foodservice director to plan the intervention, which was implemented and evaluated.

**Baseline Assessment:** Baseline assessment occurred during one day of school lunch, over all three periods. The assessment consisted of two qualitative measures: 1) DPIE General Observation Checklist and 2) Evaluation Matrix. McDowell used the DPIE General Observation Checklist to rate eighty characteristics in five major sections of the school lunchroom environment (exterior/approach to lunchroom, hot serving area, cold serving area, snack window, and dining area). Each characteristic was scored as a positive (+), negative (-) or neutral (n) impression. McDowell applied the Evaluation Matrix to score the current practices related to components of the USDA reimbursable meal (Fruit, Vegetable, White Milk, Targeted Entrée, and Reimbursable Meal). The matrix asks researchers to select the description best related to current practice in the school cafeteria in each of the five categories. Thus, the matrix produces a score for each category using a scale of 0-5, where 0 is the worst and 5 is ideal (Table 1) and an overall range of scores from 0 (minimum) to 25 (maximum).

**Intervention Development:** Following baseline assessment, the researcher met with the food service director to review findings and match the food service director’s goals for the cafeteria to the SLM strategies that would address problem areas identified at baseline. Researchers set an overall goal of increasing The Evaluation Matrix score to 18/25 based on feasible intervention

strategies as discussed with food service director. The main target areas are increasing sales of fruits, vegetables and the reimbursable meals (Table 1).

**Program Implementation:** The intervention week included the strategies listed in Table 3 under intervention plan. The April Lunch Menu was edited to include creative names for food items. For example, pre-intervention “nachos,” “meatball sandwich,” “corn” and “pineapple” became “chili and cheese nachos,” “savory meatball sandwich,” “golden corn” and “sweet pineapple.” These descriptive adjectives were intended to make entrees more appetizing. The updated menu was viewable on the school website and outside the lunchroom (Figure 1). Signage and marketing was added to the lunchroom, including three separate boards with “Fruit and Veggie Spotlights” and twelve posters displaying nutrition information and facts (Figure 2). The creative names for lunch (including the reimbursable meals) were also added to the boards during the lunchtime. Marketing targeted high school students, so messages focused on nutritional benefits of fruits and vegetables for enhancing appearance, energy level, brainpower, etc. Fresh fruit was displayed in five new baskets: three baskets in the lunch lines and two baskets in the “Grab & Go” area. Fresh vegetables were served along with the usual selection and displayed in the three lunch lines. Fruits and vegetables had creative labels in front of them. McDowell trained staff to verbally cue the students to select fresh fruit and vegetables during the lunch periods.

**Program Evaluation:** The number of reimbursable sales were obtained from the food director during the intervention week and compared to similar entrée of previous months pre-intervention. The reimbursable meal sales data were collected using sales reports provided by food service director. The post-intervention evaluation was done on 4/4 and 4/5. The lunch menu on 4/4 was: Golden Eagle rotini with meatballs, whole grain roll, delicious tuna salad sandwich, sliced peaches/chilled applesauce/whole fruit, fresh tomatoes and carrots. In order to evaluate the reimbursable meal sales, meal sales on 4/4 were compared to meal sales on 2/12 as the menus on 2/12 was similar to the menu on 4/4. The same reimbursable meal evaluation was used for 4/5. Meal sales from 4/5 were compared to 2/1. The sales report did not provide specific data fruits and vegetables, so to track fruits and vegetables the researcher tallied fruit and vegetable purchases for each student during lunch. For the fruit and vegetable tallies: the researcher stood by the cash register to record fruit and vegetable purchases. Tallies were collected on three different days during all (3) lunch periods for the baseline assessment on two different days during all (3) lunch periods for the post-intervention assessment. The baseline assessment days were 3/19, 3/21 and 3/22. The post-intervention assessment was 4/4 and 4/5. Each student received a tally mark in one of four categories, depending on their meal selection: 1) serving of vegetables, 2) serving of fruit, 3) serving of fruit and vegetable or 4) nothing (Table 1). On day 3/19, McDowell collected tallies for fruits and vegetables. On days 3/21 and 4/4, McDowell and Beelman collected tallies for fruit and vegetables during all (3) lunch periods. On days 3/22, McDowell and Berger collected tallies for fruits and vegetables during all (3) lunch periods. On days 4/5, McDowell and Hassinger collected tallies for fruits and vegetables during all (3) lunch periods.

**Data Analysis:** Descriptive statistics and pre-post comparisons in sales data were computed using Excel.

### ***Results***

The baseline lunchroom assessment resulted in mixed impressions. The positive impressions included: cleanliness of lunchroom and supplies, food at safe and tasty temperature, food appears good, orderly flow of lunchroom, efficient registers, and no traffic jams. The negative impressions included: lack of attractive healthy-food posters and lunchroom staff not cheerful, white milk 66% stock vs. 50% guideline and not the front beverage, fruit/vegetable not in two or more locations, difficult to reach, and no prompting to take fruit/vegetable. The neutral impressions included: comfortable lighting, clear and neat menu, good noise level, and neutral odor.

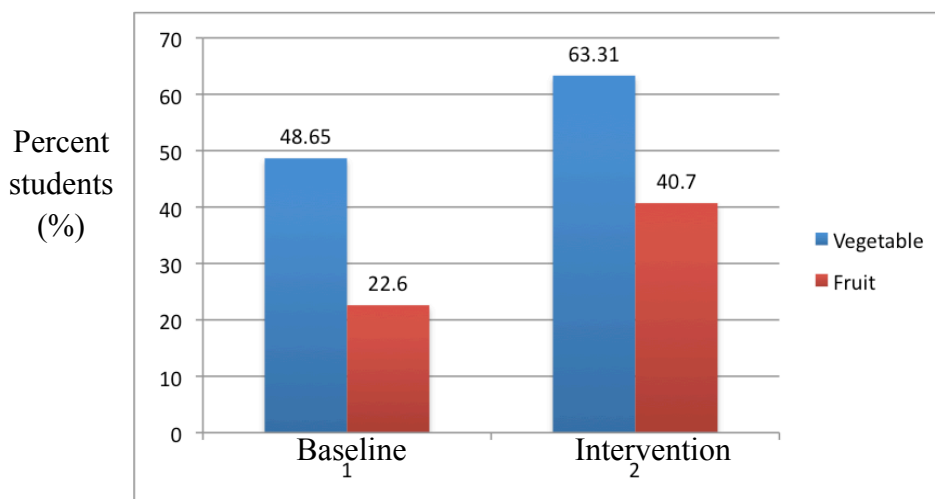
While the baseline lunchroom assessment focused on the overall impression of the lunchroom, the evaluation matrix helps to focus on five specific categories in the lunchroom and the cafeteria environment. Big Walnut HS scored 5.5/25 during the baseline assessment. The score increased to 18/25 during the intervention, due to an increase in 3 of the categories. There are 5 different categories on the evaluation matrix. The main areas responsible for the increase in score were the three categories specifically targeted during the intervention: fruits, vegetables and reimbursable meals. For fruit, researcher added whole fruit to the lunchroom in five different areas in attractive baskets with at least one by the register, which increased the score by 5 points. For vegetables, researcher added creative names and displayed on lunch line in highly trafficked areas, which increased the score by 4.5 points. The reimbursable meals were given creative, age appropriate names and verbally cued by the lunch staff, which increased the score by 3 points.

***Table 1. Evaluation Matrix Scores and Descriptions and Intervention Plan***

Category	Baseline/Pre Intervention Score (0-5)	Description	Intervention Plan	Post Intervention Score (0-5)	Description
Fruit	0	Fruit with peel is under sneeze shield in metal chaffing dish	Add whole fruit to the lunchroom in attractive baskets in 2+ areas with at least 1 by the registrar	5	Fruit with a peel is in an attractive bowl, in two or more well-lit and easily reached locations with one
Vegetables	0.5	Vegetables are difficult to identify/use but are in a well lit area or the lunch line	Display vegetables in at least two well-lit easy accessible areas and have creative names displayed next to them and on the menu posters/boards	5	Vegetables are displayed in at least two well-lit, easily accessible/highly trafficked areas and have creative and age appropriate names displayed next
Milk	2	White milk is easily reachable in at least two locations where beverages are sold/displayed but is disproportionate to flavored milks	No intervention	2	White milk is easily reachable in at least two locations where beverages are sold/displayed but is disproportionate to flavored milks
Targeted Entrée	1	Nutrient dense entrée is identified by staff and has been placed first in at least one service line	No intervention	1	Nutrient dense entrée is identified by staff and has been placed first in at least one service line
Reimbursable	2	Reimbursable meal is offered in at least two meal service lines/locations and has at least two different meal combination options	Have staff verbally cue and add creative names to the reimbursable meals	5	Reimbursable meal is offered in all meal service lines/locations, has multiple combination options, is labeled and highlighted on menu boards/posters in lunchroom and verbally cued by service staff
<b>Total Score</b>	<b>5.5</b>			<b>18</b>	

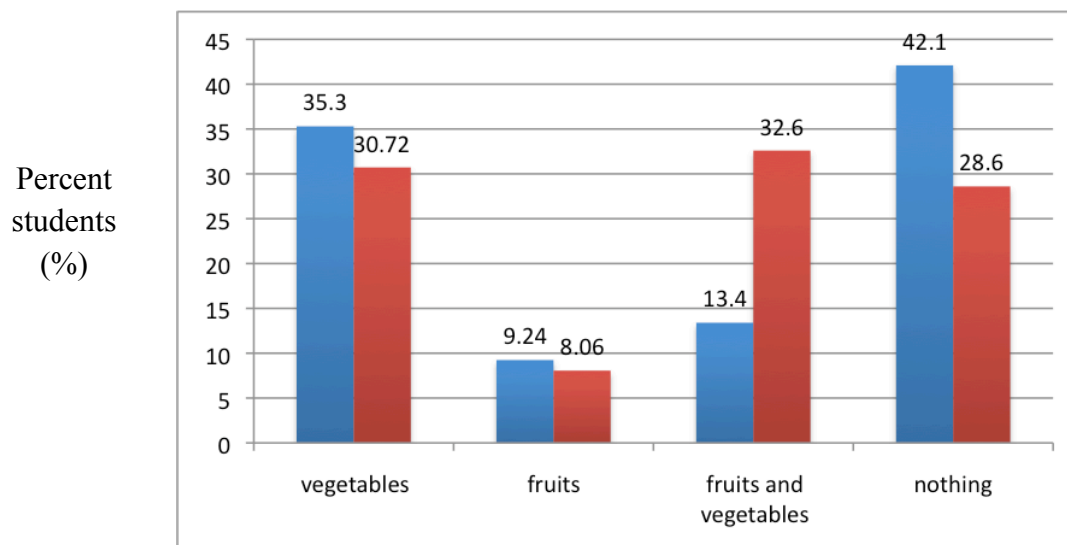
Fruit and vegetables tallies increased (Table 2). The number of students choosing fruits as a side and vegetables as a side increased (22.6 to 40.7% and 48.65 to 63.31%, respectively).

**Table 2. Percentage of Students Purchasing Fruits and Vegetables at Lunch Pre- and Post-intervention**



Examining the categories of fruit, vegetable, fruit and vegetable, and nothing more carefully also showed positive results for increased healthy eating of students in the lunchroom (Table 3). The amount of students choosing both a fruit and a vegetable increased by 20%, from 13% to 33%. Pre-intervention, the amount of children choosing no fruit or vegetable was 42%, however post-intervention the amount of students choosing no fruit or vegetable dropped to by 13% to 29%.

**Table 3. Percentage of Students Purchasing Vegetables, Fruits, Both, or None Pre- and Post-intervention**



### ***Reimbursable Meal Sales Report Data***

The total sales for reimbursable meals on April 4, 2013 were \$680.00 and on April 5, 2013 were \$582.00. The total sales for reimbursable meals on February 12, 2013 was \$770.60. Comparing this to April 4, 2013, as the lunch entrees were similar, the total sale of reimbursable meals decreased. Similarly, the total sales for reimbursable meals on February 1, 2013 was \$772.40. Comparing this to April 5, 2013, the total sales for reimbursable meals decreased.

### ***Discussion***

Overall, the SLM proves to be an effective and low budget way to improve children's food choices in the lunchroom. Using the SLM tools to conduct a baseline assessment helped researchers determine target areas in the lunchroom. Once areas were identified, researchers were able to design an intervention using SLM techniques. Purchases of fruits and vegetables increased from adding signage/marketing, creative names for menu items, and increased availability and choice. The success of this school intervention was reliant upon cooperation of the food director, as well as the lunch staff and other teachers and administrators. It was important during the research to speak to all involved parties so everyone understood the intervention process. Challenges arose during the intervention because there was not enough communication between the food director and lunch staff to understand that whole fruit and different vegetable options were also going to be offered during the week. Once lunch staff understood that there would be more options, the intervention ran smoothly.

Using the Evaluation Matrix was a key component in determining target areas for the lunchroom. However, because the Evaluation Matrix focused on specific target areas, it was also important to improve the holistic view of the lunchroom. Adding large signage/marketing throughout the lunchroom focusing on fruits and vegetables could have been another factor in students choosing more fruits and vegetables as their sides. Prior to the intervention, the lunchroom did not have nutritional posters. However, after the intervention, the lunch room had multiple fruits and vegetable posters featured around the lunch room and other posters that encouraged eating five fruits and vegetables a day. So in addition to focusing on specific areas, focusing on the whole lunch room as a target was also key in increasing the amount of fruits and vegetables bought by the students.

Another interesting observation about the increase in fruits and vegetables is that students continued to purchase canned fruit and steamed vegetables. Not all the students were purchasing the fresh whole fruit and fresh vegetable boats. However, with the addition of fresh whole fruit and fresh vegetable boats and the placement of the signs/marketing, it made fruits and vegetables more of a focus in the lunch room, which could have encouraged the students to eat a fruit or vegetable at lunch. Also, giving students more fruit and vegetable choices made it more likely that they would purchase a fruit or vegetable because they felt more in control of their decisions



and could find a lunch combination that they were excited to eat. While having fresh fruit and vegetable options are very important and helped to increase the Evaluation Matrix score, it is also important to note that the old fruit and vegetable options were still available and still being purchased by students.

Other behavioral economics studies in lunchrooms have shown similar results. In the study done in a New York City school with carrots, researchers found that simply adding creative names to carrots is effective in increasing sales. In their specific study, they also found long-term effects as their study spanned over a couple months (Wansink, et al. 2010). Also, research has been done on the effectiveness of “nudging” students into making healthier choices (Mancino and Guthrie, 2009). Nudging students employs the same psychology behind behavioral economics and is what this study did by offering more whole fruit, fresh vegetables and marketing to the lunchroom. In a similar study, when lunchrooms were redesigned to display only healthier foods, the sales of healthier foods increased by 18% and grams of less healthy foods consumed decreased by nearly 28% (Hanks, et al., 2012). This research was interesting because it not only studied the purchases, but also the consumption in the lunchroom.

Although fruit and vegetable purchases increased, the reimbursable meal sales decreased. It is important to note that evaluating the reimbursable meal sales was not done in the same way as the fruit and vegetable tallies. The reimbursable meal sales were compared to a pre-intervention day that had a similar entrée. Because of this, many other factors could have gone into the reason for the reimbursable meal sales to drop. Similarly, reimbursable meal sales were only evaluated based on 2 days, which is a limitation. It would be beneficial to average out reimbursable meal sales from a few months pre-intervention and compare to a few months post-intervention.

Future research could be done on the actual consumption of the purchased fruits and vegetables. At Big Walnut, only the fruit and vegetable purchases were tallied and collected via sales reports, so actual fruit and vegetable consumption was not measured. Also, the timeline of this research was very short as the baseline was taken over a 3-day period and post-intervention was measured over 2 days. This short timeline is a limitation, as it is unknown whether purchase fruit and vegetable purchases will remain high.

Overall, the intervention is sustainable, and the outcomes of this research will be used to design the lunch menu next year. Fresh fruit and vegetables will be offered throughout the week to give students more choices and ultimately increase the healthfulness of their school lunches. The school lunch environment is often overlooked as a place to instill healthy eating habits, however small changes can make a big difference for student health. Simply adding nutritional information about fruits and vegetables and encouraging the purchases of healthier foods can help students to learn healthier eating habits that they will take with them even after they graduate high school. SLM assessment and intervention helps target children’s eating habits in subtle but effective ways.

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